THE JOURNAL OF SCHOOL HEALTH

VOL. VIII NO. 9

November
1 9 3 8

DR. EVERETT C. JESSUP,
ROSLYN, L. I.
NEW YORK

PUBLISHED BY
THE AMERICAN SCHOOL HEALTH ASSOCIATION

THE JOURNAL OF SCHOOL HEALTH

Published monthly, except July and August, at Buffalo, N. Y.

Editor
CHARLES H. KEENE, M. D.
3335 Main Street, Buffalo, N. Y.

Assistant Editor
EARL E. KLEINSCHMIDT, M. D.
Loyola University, Chicago, Ill.

SUBSCRIPTION RATES TO THE JOURNAL

Membership dues, $2.00, including $1.75 subscription. Subscription $1.75.
Single copies 25c

Address all communications to
THE EDITOR, 3335 Main Street, Buffalo, New York

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Organized 1927

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Published by
THE AMERICAN SCHOOL HEALTH ASSOCIATION
3335 Main St., Buffalo, New York
Editorial Office, 3335 Main St., Buffalo, New York

Copyright September, 1938, by
The American School Health Association

Entered as second-class matter at the Post-Office at Buffalo, N. Y.
October 5, 1937

What Every Woman Doesn't Know

The mother who wrinkles her nose and "makes a face" of disgust as she measures out cod liver oil is almost certain to set the pattern for similar behavior on the part of her baby.

WHAT every woman doesn't know is that psychology is more important than flavoring in giving cod liver oil to children. Some mothers fail to realize, so great is their own distaste for cod liver oil, that most babies will not only take the oil if properly given but will actually enjoy it. Proof of this is seen in orphanages and pediatric hospitals where cod liver oil is administered as a food in a matter of fact manner, with the result that refusals are rarely encountered. Most babies can be taught to take the pure oil if the mother looks on it with favor. If the mother herself takes some of the oil, the child is further encouraged.

The dose of cod liver oil may be followed by orange juice, but usually no vehicle is required. If the oil is mixed with the milk or the cereal feeding, allowance must be made for the oil which clings to the bottle or the bowl.

If given cold, cod liver oil has little taste, for the cold tends to paralyze momentarily the gustatory nerves. As any "taste" is largely a metallic one from the silver or silver-plated spoon (particularly if the plating is worn), a glass spoon has an advantage.

HOW TO GIVE COD LIVER OIL

SOME authorities recommend that cod liver oil be given in the morning and at bed time so as to assure an appetite for the oil, while others prefer to give it after meals in order to retard gastric secretion. If the mother will place the very young baby on her lap and hold the child's mouth open by pressing the cheeks together between her thumb and fingers while she administers the oil, all of it will be taken. The infant soon becomes accustomed to taking the oil without having its mouth held open. Mead's Standardized Cod Liver Oil, of minimum acidity and prepared from fresh healthy livers, is well tolerated by infants and children and is palatable without flavoring. (*To be continued*)

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Vol. VIII NOVEMBER, 1938 No. 9

SOME PRESENT CONCEPTS OF TUBERCULOSIS AMONG INFANTS AND CHILDREN

LEE FORREST HILL, M.D., *Des Moines, Iowa*

Present day knowledge of the pathogenicity of tuberculosis as it affects children in the first decade of life is not to be thought of in the light of recent discovery. Rather is it the result of many years of research and study carried on in many fields, with gradual crystallization of ideas as experimentation and observation have pointed the way. While many scientists have contributed their bit toward the establishment of our present concepts regarding tuberculosis, the world is probably most familiar with the brilliant studies which have been carried out at Lymanhurst by Myers and Stewart, at the Phipps Institute in Philadelphia by Opie and McPhedran, and by Arvid Wallgren in Sweden. To these workers and authors belongs much of the credit for the development of the new viewpoint, which has resulted in such a tremendous awakening of interest and of activity on all sides in a final conquest of the great white plague.

But even now, it cannot be said that the final chapter has been written; that all the answers are known; for there are still many controversies over this theory and that one, and much that remains unknown or incompletely known. However, from a practical point of view, it does seem possible to say with some degree of assurance that enough is known about tuberculosis today so that the disease could be pretty well eradicated if it were only possible to utilize completely what is already known. The lag between acquisition of knowledge and its application is being minimized greatly in the case of tuberculosis by the wide publicity which has been and is being given to these new concepts. Both lay and scientific publications have been most generous in cooperating in this vitally important educational campaign. An excellent example of the point in question is this issue of the Journal of School Health, which is devoting nearly its entire space to the subject of tuberculosis.

In discussing the more recently acquired knowledge about tuberculosis in infants and childhood, certain major phases of the problem immediately come to mind. First of all, to what extent is the childhood population of America infected with tuberculosis? Next, what is the nature of the disease in children who do become infected? What is its course, and what is the immediate and even-

tual outcome for the average child? Are such children a source of danger to their playmates? Are any special methods of treatment indicated, such, for instance, as are employed in adults with pulmonary tuberculosis? Finally, is there any practical means of protecting infants and children against the disease? Answers to these questions will perhaps suffice for the purposes of this article.

For many years, the opinion was general that most children had become infected with tuberculosis by the age of ten; and that, therefore, tuberculin tests, unless they were negative, had very little meaning. This belief was based upon published figures obtained in Vienna in 1909, where tuberculosis at that time was very prevalent. However, when tuberculin surveys began to be carried out in this country among school children, a very different situation was found to exist. One of the earliest surveys was made by Veeder and Johnston in St. Louis in 1915, who found only forty-eight per cent of a group of twelve and thirteen year-olds infected. Several years later, Slater found only ten per cent of 1,654 rural school children in Minnesota reacted positively to the test. These early reports resulted in a great impetus to tuberculin testing all over the country, so that today statistics are available for any state in the Union. The Tuberculosis Committee of the American Association of School Physicians* has prepared a graphic map of the United States showing the incidence of positive tuberculin reactors among school children in the various states. The annual preparation of such a map is planned, and as the work progresses, important information will be supplied as to the localities in which control procedures should be concentrated. A total of 1,124,363 reports of tuberculin tests have been received, and the number tested and the positive percentages for each state have been recorded. South Dakota has the lowest rate, with 4.6 per cent positive out of 9,071 tests done. The highest rate was found in the states of Virginia, Maryland, and in the District of Columbia, where the percentages were 51.7, 42.6, and 46.4, respectively.

Another survey of national scope is the final report of the Tuberculin Committee of the National Tuberculosis Association, on the results of group testing with Purified Protein Derivative, during the two year period following June, 1934. The adjusted infection rate for the United States based upon 56,688 persons tested in thirty states and the District of Columbia, is as follows:

All ages	47.0%
Under five years of age	24.9%
Five to nine years of age	21.6%
Ten to fourteen years of age	28.4%
Fifteen to nineteen years of age	31.9%
Twenty years of age and over	60.1%

These are the figures to be quoted as representative of the general population of the United States.

*Now the American School Health Association.

An entirely new meaning has been given to the tuberculin test since it has been realized that tuberculous infection is far from being universal, as it was once thought to be. A positive test now immediately raises the question as to who infected the child, and not infrequently leads the way to the detection of an unsuspected spreader of tubercle bacilli. Every encouragement should be given to tuberculin testing programs, for they provide the means by which the nests of tuberculous disease can most quickly be brought to light.

Tuberculosis as it occurs in the first decade of life is almost always an entirely different type of disease than is visioned by the average lay person when the term "tuberculosis" is mentioned. Children, and adults as well, who receive tubercle bacilli into their bodies for the first time, undergo what are known as primary or first infections. Such infections are quite different from chronic pulmonary reinfection tuberculosis, or what is commonly known as consumption. The latter is seldom seen before the age of puberty, but is the common cause of disease and death during the teen years and in adult life.

The usual course of a primary infection, at whatever age level it occurs, is something as follows: Tubercle bacilli lodge in the lung parenchyma at one or more focal points. During an incubation period of three to seven weeks, tubercle formation goes on about these lung foci, and tubercle bacilli drain into associated tracheobronchial lymph nodes. The end of the incubation period is marked by the tissues of the body taking on an entirely new property known as sensitization or allergy, which has resulted from the absorption of tuberculo-protein produced by the growing tubercle bacilli. The tuberculin test now for the first time becomes positive. Coincident with the development of allergy in a few of the cases, certain symptoms suggestive of influenza or a cold may appear and persist for a week to a month. Physical signs are usually completely absent. In approximately four per cent of the cases, an x-ray film of the chest will show a shadow occupying part or the whole lobe of a lung, which is due to a collateral inflammatory reaction about the pulmonary focus. The remainder of the cases give no evidence, beyond the mute testimony of the positive tuberculin reaction, that a tuberculous infection has taken place. As a rule, primary infections occur and run their course without parents, child, or physician being aware of what has happened. In the course of a few months up to three years, the original pulmonary focus or foci, together with the foci set up in the lymph nodes, have resolved to inconsequential calcifications, fibrous strands, or have disappeared altogether.

Young children, particularly infants in the first year of life, who become infected, run some risk of developing a fatal form of tuberculosis. This comes about when the initial infecting dose of

organisms is too massive or the local defense mechanism fails to confine the rapidly multiplying organisms within the limits of the primary complex. Germs thus liberated spread by way of the blood stream to be deposited in various organs of the body, such as the brain, lungs, liver, spleen, kidneys, bones, and joints. Or, a caseous tracheobronchial lymph node may rupture and its contents be aspirated via a bronchus directly into one of the lobes of a lung. Clinically recognizable disease resulting from such complications of a simple primary infection, are classed by the Lymanhurst workers as acute reinfection forms of tuberculosis, because tubercle bacilli this time have been deposited, not on normal tissues, but on sensitized tissues. The common acute reinfection forms of tuberculosis are tuberculous meningitis, tuberculous bronchopneumonia, and miliary tuberculosis. Practically all infants who die from tuberculosis die from one or more of these forms.

More concrete information concerning the mortality in infants and children can be obtained from reference to the reports of Brailey* at the Harriet Lane House of the Johns Hopkins Hospital, and of Rosenberg and Kereszturi† in New York City. Brailey observed a group of 170 tuberculin positive infants, of whom seventy-two were white, and ninety-eight were colored. Children found to be infected before six months of age had a mortality rate of 33.3 per cent within the first year of observation, and of nearly seventy-eight per cent within five years after the discovery of the infection. When infection was postponed until after six months of age, or until the second year of life, the mortality rate was only fourteen per cent within one year, and sixteen per cent within five years. Rosenberg and Kereszturi found that of the infants infected during the first three months of life, 43.7 per cent died. Seven per cent of the white children and 15.8 per cent of the colored children of the total group of 348 infants died during the first five years of life. No deaths from tuberculosis occurred in children over three years of age. As a contrast to the seriousness of tuberculous infections contracted in the first six months of life, with the relative triviality of the disease in older children, the experiences of Wolff and Hurwitz‡ may be cited. These authors followed 162 ambulatory tuberculous children for an average period of seven years. Only one death in the group occurred, and that was in one of the youngest children from tuberculous meningitis.

And now, if we follow along the course of these children who have experienced primary infections and have satisfactorily resolved their lesions, what is their ultimate fate? Are they better or worse off so far as further risks from tuberculosis are concerned than

*Brailey, Miriam: Mortality in Tuberculin Positive Infants, Bull. Johns Hopkins Hosp. 59: 1, 1936.

†Rosenberg, H. A., and Kereszturi, C.: Fate of Children Infected with Tuberculosis During the First Five Years of Life, Am. J. Dis. Child. 54: 15, 1937.

‡Wolff, E., and Hurwitz, S.: A Follow-Up Study of Ambulatory Children with Tuberculous Infection, J. Pediat. 9: 467, 1936.

their uninfected playmates? One group of phthisiologists believes they are better off, in that they have acquired an immunity from their primary infections which will protect them from the danger of developing chronic lung disease, should they be exposed to any but very massive reinfections in the future. This opinion is not shared by the Lymanhurst workers, who have conducted a longitudinal study of many thousands of tuberculous children over a period of nearly twenty years. Myers states that "children who react positively to the tuberculin test are much more likely to develop the reinfection destructive type of disease during and after adolescence than those who react negatively. In a group whose observation began in 1921 when the average age was approximately eight years, it was found that those who reacted positively to the test were five times more likely to develop the clinical type of disease by the time they had reached their majority than those who had reacted negatively to the test."

Children with positive tuberculin tests possess two distinct disadvantages over those with negative tests. First, their tissues have been rendered sensitive or allergic, so that subsequent reinfections, whether exogenous or endogenous, may result in a destructive form of disease. Second, it has been demonstrated by Robertson of the Mayo Clinic, that virulent tubercle bacilli may remain viable within the calcified foci of the primary complex for many years—possibly throughout the lifetime of the individual. At any time there exists the possibility that such encapsulated bacilli may become liberated and seeded upon allergic tissues where they may set up an area of chronic disease. While the great majority of children with positive tuberculin tests pass on and through adult life without developing signs or symptoms of illness, they nevertheless, form the group which should be kept under careful observation through the teen years and young adult life. Experience has shown that pulmonary tuberculosis can be detected in the x-ray film two to three years before its presence is revealed by symptoms and physical signs, and therefore, at a time when treatment is simplest and most effective. At least yearly x-ray films of the chests of all positive reactors after the age of puberty ought to be a routine procedure.

Thus it is seen that primary or first infection tuberculosis is a very benign type of disease, seldom making its presence known by signs of illness, except in infancy when there is serious danger of fatal complicating forms developing. The reason for the almost complete freedom which children under the age of puberty enjoy from chronic pulmonary disease has long been a subject of speculation. Myers recently has advanced the explanation that "The long period of time that is required for tuberculosis to develop into clinical disease in the human body probably is responsible more than anything else for the absence of symptoms and illness during the

period of childhood to adolescence." While both the immediate and remote prognosis so far as the first infection type of tuberculosis is concerned is excellent, nevertheless experience has shown that approximately ten per cent of all children who have acquired first infections are destined to fall ill with chronic pulmonary tuberculosis sometime after the age of puberty.

To the question as to whether children apparently healthy in all respects except for a positive tuberculin test, are potential sources of danger for their playmates, the answer can be given at once in the negative. During the acute phase of the primary infection, tubercle bacilli can be recovered from the gastric contents or from stools in a fairly high percentage of cases. But when the lesions have become as old as seven months, recovery of organisms by these methods is not frequent. Ambulatory children with positive tuberculin tests, then, do not constitute a public health problem so far as the spread of contagion by such individuals is concerned.

The ability of children to heal their primary tuberculous infections without recourse to special methods of treatment has been demonstrated repeatedly. Expenditure of funds to maintain such children in sanatoriums, preventoriums, special schools, fresh air classrooms, or summer camps, is hardly justifiable, in view of the much greater returns possible, in terms of tuberculosis control, to be had by applying the funds to tuberculin testing programs and searching out and segregating the sources of contamination of the positive reactors. It is essential that the infected child be protected from further risk of contamination by removing the source of contagion from the immediate vicinity. When this can be done, the child's own home or a foster home supplies all that is necessary in the way of treatment facilities, thus saving a hospital bed or a bed in a sanatorium for those cases which need them, namely, open cases of tuberculosis. Strict bed rest and the various methods of collapse therapy are seldom, if ever, required in treating first infection tuberculosis, even during the acute state when the pulmonary shadow may be quite extensive. However, if the disease is discovered in the febrile stage, bed rest is indicated until this is past and the sedimentation rate has come to normal. The special reason for such precaution is to minimize as much as possible the risk of the development of tuberculosis meningitis and miliary tuberculosis, both of which have been shown to be closely related to the earliest stages of the primary infection.

For sake of completeness, some mention should probably be made of the experimental work now being carried on with cevitamic acid in the treatment of tuberculosis. Study has shown that this factor is often low in tuberculous disease, and that quite large quantities must be ingested daily to maintain normal levels. Favorable results with this type of therapy have been reported by some observers, but as yet the method is still experimental—not proven.

Finally, a word about available means for protecting children against acquiring tuberculous infections. The only method of prophylactic vaccination which has been attempted on a large scale, is that of Calmette, who, some years ago, succeeded in developing a markedly attenuated and avirulent strain of bovine bacilli, to which he gave the name B. C. G. Over a million infants in France and on the continent of Europe, and a few in this country, have been inoculated with this vaccine. No final conclusion as to its efficiency or freedom from danger have been agreed upon as yet. It lacks many of the features which an immunizing process ought to possess if it is to become generally employed.

Until great improvement is made, or some new specific means of immunization is devised, the only satisfactory method of protection is to prevent children from acquiring the first infection type of tuberculosis by avoiding contact with tubercle bacilli. Nor is this as remote a possibility as it may seem—the veterinarians have already succeeded in making the bovine environment safe for calves. The means are available for achieving the same results for children in the human world.

The points brought out in this discussion may be summarized as follows:

1. New concepts of the pathogenicity of tuberculosis and its evolutionary course have gradually been crystallized as the result of many years of study and observation carried on by many workers on many fronts.

2. Tuberculous infection is far from being universal among the children of America.

3. Primary tuberculosis in children runs a course comparable to other acute infections, except that it is more obscure and requires special means for detection.

4. The immediate prognosis of primary tuberculosis in infants and children is excellent, except in the first few months of life, when fatal complications not infrequently occur.

5. The remote prognosis for children who have acquired the first infection type of tuberculosis must be guarded, for approximately ten per cent of them will become ill in adolescent or adult years from chronic pulmonary tuberculosis.

6. Children with first infection tuberculosis are not a source of contamination for their playmates except in the first few months of their infection, and then to a limited degree only.

7. Special methods of treatment are not necessary in primary tuberculosis.

8. Prevention of primary tuberculosis in children is best accomplished by avoidance of contact with tubercle bacilli.

704 Equitable Building.

THE CONTROL OF TUBERCULOSIS

J. ARTHUR MYERS, M.D.,* *Minneapolis, Minnesota*

An effective defense mechanism which acts quickly when tubercle bacilli enter for the first time is ever present in the human body. The first line of defense is composed of neutrophils, which phagocytose the tubercle bacilli and focalize them at certain points within an hour after they have been introduced into the blood stream of an animal. The points of focalization are most often in the lung, although bacilli may be deposited in many other parts of the body.

The polysaccharid content of the bacilli is toxic to the neutrophils and as they are dying or disintegrating, the second line of defense appears. This consists of monocytes, which ingest the neutrophils with their tubercle bacilli content. The monocytes are not capable of destroying all of the tubercle bacilli. However, they are soon converted into epithelioid cells.

Within three to seven weeks after tubercle formation begins, the tissues of the body become sensitized to tuberculo-protein, after which the individual reacts to tuberculin as long as tubercle bacilli remain alive and liberate protein. Although a calcium and sometimes an oseos wall is developed around the foci of tubercle bacilli, the micro-organisms may remain alive over a long period of time. When tubercle formation begins some of the bacilli are carried to the regional lymph nodes, where foci are established. These foci in the lymph nodes, together with the original focus in the lung, constitute the primary tuberculosis complex, often spoken of as the first infection type of tuberculosis.

The primary tuberculosis complex usually causes no extensive destruction of tissues, and does not produce significant symptoms. In some cases, when allergy develops to a high degree, an elevation of the body temperature occurs. Usually this does not remain longer than two or three weeks. In many persons temperature elevation is absent. At the same time, the sedimentation rate may be definitely increased, but this is also of short duration. Rarely, if ever, are underweight, anemia, or other symptoms caused by the first infection type of disease. Indeed, most persons who have developed the primary tuberculosis complex are unaware of its existence except when the tuberculin test is administered. Thus, the first infection type of tuberculosis is an extremely benign disease, since it begins its development on tissues that are not sensitized to tuberculo-protein, and the bacilli are usually well under control before allergy is established to a high degree.

The detection of the primary tuberculosis complex in a human body, regardless of age, is simple. Indeed, nothing more than a tuberculin reaction is necessary to establish the diagnosis. However,

*Dr. J. A. Myers was President of the National Tuberculosis Association 1937-1938, and is Chairman of the Tuberculosis Committee of the American School Health Association.

the determination of the location of the primary complex in the living body is met with numerous difficulties. In a small percentage of persons who have the primary focus in the lung, the x-ray film aids in locating it. About the time allergy appears, a pneumonic area may develop around the lesion. When this is sufficiently large it casts a homogeneous shadow which, from an x-ray examination alone, cannot be differentiated from ordinary pneumonia. Usually, after several months, the pneumonic area resolves so there is no longer a shadow cast on the x-ray film. From several months to two or three years later, however, lime may have been deposited in such quantities as to be visualized on the film as a sharply outlined, often irregular, dense shadow. Lime may also appear in the lesions within the regional lymph nodes, and dense shadows may then be visualized in the hilum region. The parenchymal lung lesions may be multiple.

When most detailed x-ray examinations are made in various diameters, it is unusual to locate lesions in more than 20 to 25 per cent. The remainder of the lesions constituting the primary complex cannot be located during life because they are too small to cast shadows that can be visualized on the x-ray film, or are located in parts of the body which do not lend themselves to x-ray examination. Therefore, there is little advantage in making x-ray films of the chests or other parts of the bodies of positive reactors from the standpoint of locating the primary complex. Moreover, there is no advantage in knowing of its location; the tuberculin test suffices to inform us of its presence somewhere in the body.

No active treatment has been found to be necessary for persons who have the primary tuberculosis complex. If the disease is detected during the brief febrile period or while the sedimentation rate is increased, bed rest is indicated, as in any other condition causing fever. The duration of symptoms is too short to warrant sanatorium treatment. However, with or without bed rest, practically all of the lesions come under control. It has been shown that persons with the primary tuberculosis complex treated in the sanatorium or preventorium do no better than those treated in a special day school for tuberculous children; moreover, those treated in a special day school do no better than those who remain in their homes; furthermore, those who remain at home and are placed on strict bed rest do no better than those who continue in the usual activities of life. Therefore, no active treatment is indicated for the individual with the first infection type of tuberculosis, whether it be detected in the pneumonic stage or at some subsequent time in its course of development.

However, there are two very important procedures for every person, regardless of age, who is found to have a positive tuberculin reaction: The first consists of breaking contact with all persons who have tuberculosis in contagious form, since to allow exogenous

reinfection may jeopardize the future health of the individual; the second consists of making careful annual examinations, including x-ray films of the chest, of all persons who react to tuberculin as soon as the period of adolescence approaches and annually thereafter, in order to detect the reinfection type of disease if and when it appears in the lung, at the earliest possible stage, when it can be treated quickly and successfully in more than 90 per cent of the cases.

Although the primary tuberculosis complex is benign, requires no active treatment, and usually is not a communicable disease, it sets up in the body a double health liability: First, it establishes and often perpetuates a sensitization of the tissues to tuberculoprotein, which is essential for the development of reinfection forms of tuberculosis which result in great destruction of tissues and much morbidity and mortality from the disease. The second liability from the primary complex consists of tubercle bacilli escaping from the prisons which the defense mechanism has thrown up around them. Good evidence has accrued to show that nature may defeat her purpose; she first lays down a prison wall and at some subsequent time may treat it as a foreign body and resorb it, thus liberating upon allergic tissues living tubercle bacilli. Therefore, if we allow the primary complex to develop in the human body it is beyond recall; we have nothing by way of medication, no mechanical procedure, or anything else that will destroy the tubercle bacilli. Those who believe that an immunity develops are confronted with the well-established fact that it does not suffice to destroy all of the tubercle bacilli.

Therefore, the only method of dealing adequately with the problem of the first infection type of tuberculosis in the human body is to prevent its development. This is being accomplished successfully through preventing contact, both direct and indirect, between persons and animals with tuberculosis in contagious form with the uninfected part of our population. A decade or so ago it was generally believed that approximately 95 per cent of the children of this country had developed the primary tuberculosis complex by the time they had reached the age of fifteen years. However, through pasteurization ordinances, area testing of cattle, isolation or treatment of persons with contagious tuberculosis, the situation has been almost completely reversed. Indeed, at present in many parts of the country not more than 10 to 15 per cent of the high school girls and boys have developed first infection type of tuberculosis and in some parts of the country already less than 5 per cent have been infected. The incidence of the first infection type of tuberculosis among girls and boys depends upon the care which has been employed to protect them against tubercle bacilli. If our present program of prevention continues, the time is not far distant

when the positive tuberculin reactor, even during the high school age, will be rare.

All children and young adults should have the tuberculin test administered, since the absence of a reaction is excellent evidence that the primary tuberculosis complex has not been established in the body. However, a tuberculin reaction informs us of two very valuable facts: First, the reactor has been in contact either directly or indirectly with some person or animal suffering from tuberculosis or acting as a carrier. With this information one may seek the source among the associates of the reactor. When this is done, not infrequently one brings to light a person with tuberculosis in contagious form which has previously been unsuspected or never before has been examined. Thus, the person discovered to have communicable tuberculosis may be treated or isolated for his own good, and his associates may be protected against further exposure.

The second fact of practical value obtained by the tuberculin test is that a primary complex is present somewhere in the body of the reactor. Inasmuch as the primary complex always precedes clinical forms of tuberculosis, one should immediately proceed with other phases of examination to locate lesions of the reinfection type, even though they be in the pre-symptom and non-communicable stage.

The reinfection form of tuberculosis always develops on allergic tissue. In sharp contrast to the first infection type of disease, it causes great destruction of tissue and is responsible for practically all of the morbidity and all of the mortality from tuberculosis in the human family. The reinfection type of tuberculosis may appear in acute or chronic forms. The more usual acute forms are meningitis, miliary disease, and pneumonia.

The chronic reinfection form of pulmonary tuberculosis is the most common lesion to develop in the bodies of persons who have the primary tuberculosis complex. Morever, this form of the disease is more responsible than all others for perpetuating tuberculosis in the human family, since sooner or later it may communicate with the bronchial tree and disseminate tubercle bacilli to the outside world. Therefore, it is extremely important to detect pulmonary lesions of the reinfection type as soon after they start to develop as possible. Usually such lesions pass through a long period of development before they cause any external manifestations. In fact, there is an average period of two or three years after this form of tuberculosis can be detected and the lesion located by x-ray film examination before any symptom whatsoever appears and usually before there are any significant physical signs.

Another very important but well-established fact is that when symptoms are present to such an extent as to bring the patient to the physician for examination, 80 to 85 per cent of such persons already have the disease in the moderate or far advanced stage.

Most of these persons are already disseminating tubercle bacilli to their associates, and in most of them, if treatment is successful at all, it is only after long periods of time, usually years of isolation and surgical procedures. Therefore, our tuberculosis program must eventually consist of administering the tuberculin test to all apparently healthy human beings. X-ray films of the chests and other necessary procedures should be made of all positive reactors, in order to find not only the lesions which are already extensive and communicable but also the lesions of recent development.

A practical fact is that prior to the period of adolescence the reinfection form of pulmonary tuberculosis in a communicable stage is extremely rare. Indeed, one must examine from two to four thousand grade school children who react to the tuberculin test to find a single child with pulmonary tuberculosis of the clinical type. Therefore, one can dispense with making x-ray examinations of the chests of children with a reasonable degree of safety. Among high school children, one may expect to find a pulmonary lesion of the reinfection type once in every five to eight hundred tuberculin reactors examined; whereas, in the third and fourth decades of life and thereafter such a lesion may be found in every one to two hundred reactors.

We now have available approximately 74,000 beds in the sanitoria of the United States. The best phase of their service has been the isolation of persons with contagious tuberculosis so as to break contact with the members of their families and their other associates. Still a good many tuberculous persons have their disease detected when it is so extensive that a long period of hospitalization is necessary, often for the remainder of their lives. For such persons, the sanatorium offers its greatest service. Moreover, the general hospitals have opened their doors to the tuberculous patient to such an extent that in 1934 more than 35,000 patients were isolated and treated in them.

The most simple and effective method of collapsing the diseased lung is by artificial pneumothorax. Formerly the indications for this form of treatment were advanced disease in one lung, the presence of cavities, hemorrhage, etc. Always a period of several months of strict bed rest was first employed. Greater experience with artificial pneumo-thorax has in recent years led to a change in its indications so that now many physicians employ it in the treatment of minimal pulmonary lesions which are progressive. For them, artificial pneumothorax may be employed successfully on an ambulatory basis; that is, they spend little or no time in strict bed rest while the lung is being collapsed. Most persons in this group do not find it necessary to discontinue their work. The rest of the diseased part brought about through collapse suffices to direct the disease toward healing. If the lesions already disseminating tubercle bacilli are successfully collapsed, the sputum usually becomes negative or

completely disappears. If the lesion has not yet broken down so as to liberate tubercle bacilli, collapse will often suffice to prevent the individual from falling ill and from eliminating tubercle bacilli.

Extrapleural pneumothorax and thoracoplasty may be resorted to when pleural adhesions prevent the administration of artificial pneumothorax. By these procedures, particularly the latter, one is often able to bring about obliteration of cavities and collapse of the diseased areas, thus inhibiting the proliferation of tubercle bacilli and stimulating the formation of scar tissue. In addition to the excellent results obtained for individual patients, collapse therapy is an excellent public health measure in that it frequently results in complete disappearance of sputum and thus renders the patient a safe human associate.

We have before us a demonstration in tuberculosis control which from the standpoint of success far exceeds all other demonstrations in the world's history. It is that which has been accomplished by the veterinarians and closely allied groups. So certain was the veterinarian that every animal reacting to tuberculin contained tuberculous lesions and, therefore, was a potential reservoir of tubercle bacilli that he at first established an isolation procedure for all animals reacting to the test regardless of their sleekness and general good health. However, the fact was soon recognized that maintaining two herds on the same farm was not only an inconvenience but was decidedly unprofitable, because of the number of animals in the infected herd constantly falling ill from tuberculosis. The recognition of this fact led to the recommendation that all cattle reacting to tuberculin be slaughtered. This was the veterinarian's method of preventing contact between infected and uninfected animals, and it has been so effective that by September 1, 1938, all of the 3,134 counties in this nation except fourteen had been accredited. Indeed, it now appears that these fourteen counties will be accredited within a year.

The program to control tuberculosis in human beings now in effect in many places, and proposed for all, should be just as effective as that of the veterinarian. For example, through the tuberculin test we quickly find practically all persons who are potential cases of clinical tuberculosis. These persons immediately are subjected to adequate physical examination, including x-ray films of the chest. This detects practically all who at the moment have lesions discharging tubercle bacilli, as well as many who are developing lesions which will be communicable in the next few years. For those whose lungs appear clear, annual examinations will reveal lesions which develop subsequently, as they are approaching the communicable stage. All persons who have lesions of such extent or involving both lungs so that they can not immediately be rendered non-communicable should be isolated at once, preferably in hospitals. As long as these patients are left in their homes and their communities,

they will pass on tubercle bacilli to their associates and, sooner or later, a harvest of tuberculosis must be reaped among these associates.

In places where there is a lack of sanatorium beds, general hospitals may be used to great advantage in the isolation of tuberculous patients. Thus, the spread of the disease in the community is stopped. This is as valuable as far as the general public health is concerned as is slaughter among the cattle herds. However, it must constantly be kept in mind that it is as important to protect hospital personnel as it is members of patients' families.

In an adequate program of finding cases of tuberculosis, many lesions are discovered at a time when collapse therapy, particularly artificial pneumothorax, can be instituted and the sputum rendered negative or even prevented from becoming positive with a very brief period of hospitalization or none at all. This procedure is just as effective from the standpoint of the public health as the veterinarian's slaughter. Indeed, on the whole it is more effective, for while the veterinarian sacrifices the life of the animal, we save the human being for a life of usefulness.

John Bruce McCreary, M.D.—President of the American Association of School Physicians, 1932-33.

John Bruce McCreary, M.D., died at his home at Shippensburg, Pennsylvania, on September 13, 1938.

Born in Gettysburg, Pennsylvania, in 1870, Dr. McCreary was educated at the Cumberland Valley State Normal School, now the Shippensburg State Teachers College, where his father, John F. McCreary, was President. His medical degree was from the University of Maryland, 1892. He practiced medicine in Shippensburg until 1917, serving from 1911 to 1917 as part-time school medical examiner for the State Department of Health. He entered the United States Military Service in May, 1917, with the grade of Captain under the Provost Marshal until September, 1917. Served in General Hospital No. 9, Lakewood, New Jersey, until September, 1918, when he was commissioned Lieutenant-Colonel and was placed in command of General Hospital No. 12, Baltimore, North Carolina, serving there until November, 1919. He was Colonel in the Medical Reserve Corps. In 1925 he was made Chief of the Division of School Inspection for the Pennsylvania State Health Department, and in November, 1928, became also Deputy Secretary of Health, which position he resigned in November, 1935 to give his full time to the practice of medicine in Shippensburg.

Dr. McCreary had a long and distinguished service in the private practice of medicine and in the field of public health.

TUBERCULOSIS AMONG CHILDREN OF SCHOOL AGE
(Measures other than Isolation Treatment)

CHESLEY BUSH, M.D.,* *Livermore, California*

Are measures of general health building important in problems of tuberculosis among children of school age, as well as isolation from infection? What is now considered the relative importance of "endogenous" (infection by extension from within) to "exogenous" (infection from the outside) in the development of tuberculosis?

We need only to look back a few years to see that a tremendous revolution has taken place in our conception and methods of handling tuberculosis in children. In 1926 the International Tuberculosis Union met in Washington, D. C.—together with the National Tuberculosis Association—and at that time leading tuberculosis physicians from over the world expressed their adherence and belief in the conception that tuberculosis was a disease beginning with infection in childhood—and spreading thereafter through the body at times of lowered resistance, but with no possible danger due to added infection from outside sources after the original infection. A lone voice or two from America, notably Lawrason Brown, added a note of skepticism to this dogma—but there was no marked dissent.

This point of view was, of course, the same as that which had been carried on from the turn of the century; and was the driving force which planned the first open air school in 1904 in Charlottenburg, Germany, and the numerous duplications of that plan of guardianship of the health of children—as well as the later development of preventoria, summer camps, nutritional campaigns, rest classes, and the like in this country. Health educational campaigns as devised under this former conception of the development of tuberculosis naturally stressed the protection of the health of the child in order to maintain the natural barriers of resistance to the so-called endogenous (re-infection from within) spread of already existing infection. These campaigns assumed that all children were potentially tuberculous, as well as the children of tuberculous parents. They also assumed that childhood tuberculosis developed in the same way as did the familiar later disease in adults, namely by symptoms such as loss of weight, etc., and for a time there was an assumption broadcast widely that all children 15% or more underweight were susceptible to tuberculosis. Thus was born the so-called *"pre-tuberculous"* child idea.

It was left to the Americans to point out the fallacy of this old conception. They had the advantage of improved diagnostic facilities, such as better x-rays, tuberculin testing of large groups under controlled conditions, and a better understanding of the anatomy,

*Superintendent, Arroyo Sanitorium of Alameda County.

physiology, and pathology of lung structure. Their work has shown us that:

1. First infection types of tuberculosis heal readily if continued infection is stopped. (Removal from contacts: prevention of exogenous infection.)
2. In dealing with tuberculosis among school children we must first have accurate diagnosis, such as the use of tuberculin and the x-ray.
3. We must have simple classification of tuberculous conditions.
4. That tuberculosis is becoming uncommon among school children in many parts of America.

However, there is no doubt that endogenous re-infection does play a part in the spread of tuberculosis in the bodies of boys and girls, particularly when they reach the years of adolescence. And so, today, we find that any health measure which increases the natural immunity of the body prevents the spread of tuberculosis—provided tuberculosis already exists in a diagnostic form.

We can divide children into:

1. Those negative to tuberculin.
2. Those positive to tuberculin.
3. Those with evidence of childhood type tuberculosis infection.
4. Those with evidence of childhood type calcification (healed).
5. Those with progressive "adult" type disease.
6. Those with arrested "adult" type disease.

Protective treatment, other than protection from outside sources of infection which is the first and most important treatment for all these groups, varies with the groups, as follows:

1. Those negative to tuberculin need no special supportive care.
2. Those positive to tuberculin, without other evidence of lesion, need no special supportive care.
3. Those positive to tuberculin and with x-ray evidence of inflammatory processes undergoing changes in the lungs should be given special attention. Most of these children recover and go on to healing if not given prolonged re-infection from outside sources, but for the period of changing lesion they should be given a rest program which varies from complete bed rest to modified bed rest programs in a sanatorium or at home. These children may have living viable tubercle bacilli in the washings of the early morning stomach content, swallowed during the night even though they have no cough or expectoration. While this state of affairs may not be an important factor in the spread of tuberculosis from one child to another, it is worth consideration of temporary isolation from school.
4. Those with evidence of childhood type tuberculosis shown by x-ray to be calcified or healed, particularly where the calcifications are of some size, should be considered in dan-

ger of "endogenous" spread—and this particular group of children will repay any additional care—such as added provision in their school career of a "rest hour," decrease of requirements for strenuous exercise in physical education to what may be called "rest gym." This is the type of child that may benefit by a period at a "preventorium," although such an institution seems hardly necessary unless there are insufficient beds in the community to isolate the infecting parents. In this case, a children's institution may be used to isolate the children from the parents until such time as the parents can be cared for themselves.

5. With the progressive adult type of disease, the child should be given every care that an adult would receive—even to collapse treatment of lung lesions. This is carried out preferably in a sanatorium or hospital.
6. The child with arrested "adult" type should receive every school aid—"rest gym," rest hours, and additional nutrition until such time as medical supervision suggests otherwise.

Where there is no classification of school children on a tuberculosis basis—any health program applied to "under-par" groups or "contact" groups will naturally be a "shot-gun" prescription, in that it will benefit the tuberculous and non-tuberculous alike. These health programs may be:

1. Open air schools; The idea of open air as the sole preventative of disease has largely been abandoned. These schools or classes should properly be called "rest classes," inasmuch as one or two hours of complete rest can be integrated into the school day, children using a bed or cot and being under the supervision of a school nurse, or teacher if a nurse is not available. Children will gain in weight with the addition of one hour of complete rest to the school program—more than with the addition of extra nutrition, such as milk, orange juice or a hot daily luncheon. All children who return to schools from treatment of tuberculous lesions should have the benefit of such a rest program.
2. Rest gym; This is substitution for gymnasium or athletic hour—or rest program, such as above. All children with suspicious lesion of tuberculosis should be allowed to substitute this regime.
3. Summer camps; It is doubtful whether a temporary camp of this sort has any real effect in tuberculous processes. The change is too brief, and the results too temporary.
4. Nutritional classes; A rest class is probably superior.
5. Preventoria; Rest classes are an economic substitute—unless children have to be isolated from their tuberculous parents because of lack of adult isolation beds.

Conclusions:

1. The general care of health of school children is beneficial in preventing the "endogenous" spread of tuberculosis already existing in the body.
2. These programs are specifically effectual only where children are tuberculin tested and x-rayed, and classified as to their tuberculous status.
3. Anti-tuberculosis work has created, in the past, programs beneficial to the general health of school children—many of which have been incorporated into the architecture and operation of all schools.

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Honor to Dr. Keene—At the General Session of the American School Health Association which was held in Kansas City, Missouri, the medal and certificate of the Ling Foundation was awarded to Charles H. Keene, M.D., Professor of Hygiene, and Director of Health and Physical Education at the University of Buffalo "In recognition and appreciation of active and unselfish work in the behalf of health work of children." Dr. Keene was for ten years Director of Hygiene in the public schools of Minneapolis, Minnesota, organizing the activities of the school physicians, school nurses, physical educators, recreation leaders, and special class teachers, and being responsible for the sanitation of school buildings and for the teaching of hygiene. For five years he was in charge of similar activities in Pennsylvania as Director of the Bureau of Health Education in the State Department of Public Instruction. Dr. Keene has also done tuberculosis work for the State of Delaware, and health work in New England for the American Red Cross.

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Tuberculosis in Illinois—In 1918, the first year of reliable statistical data in Illinois, the death rate from tuberculosis in Illinois was 128.7 per 100,000 population. For the first eight months of 1938 the rate (annual basis) was 46.7 per 100,000 people and the prospects are bright that the rate for the entire year will be no higher. Had the 1918 rate prevailed in 1938, there would have been about 6,700 instead of only 2,465 deaths from tuberculosis during the first eight months. It appears now that there will be not more than about 3,700 deaths from tuberculosis in Illinois during 1938. If the 1918 rate had prevailed, there would have been about 10,000. In other words, applied science is now saving from tuberculosis alone approximately 6,500 lives per year in Illinois, and preventing a much greater number of cases of illness from that disease.—Illinois Health Messenger, November 1, 1938, page 117.

TUBERCULOSIS CASE FINDING IN THE SCHOOL*

J. B. NOVAK, M.D.

The casual observer watching the performance of group tuberculin testing marvels at the simplicity of the procedure. Students after being tested are often heard to remark, "Is that all?" Actually, tuberculin testing of even sizeable groups is a relatively simple task. However, the testing in itself is only a small part of a tuberculosis case finding project.

We wish here to outline, briefly, the plan we have employed in tuberculosis case finding in the schools of Chicago and its suburbs. This procedure has been developed by the staff of the Chicago Tuberculosis Institute over a period of eight years.

Having selected the school to be tested, it is advisable to consult with the local health officers, school officials, and prominent members of the P. T. A. They must be thoroughly acquainted with the necessity of such a project, and a comprehensive plan, for conducting the work, must be formulated. Since their approval and cooperation is essential, no one of consequence should be omitted from this conference. Many a potential project has gone amiss because someone has been "slighted" by omission from this initial meeting.

The amount and type of *publicity*, which should take the form of *health education* rather than propaganda, is perhaps the one most important factor in the success of any case finding project. Good publicity can do much to expedite the program by gaining the support of the community. We have always begun this phase of the work about three weeks before the actual testing, and have stressed the infectious nature of the disease — tuberculosis, the innocuousness of the test, the significance of positive and negative reactions, and the reason for and importance of x-raying all positive reactors. The moral obligation of each individual to his neighbor may be emphasized. *The laity must be made health minded, but not frightened.*

Publicity and education may be conducted via several media— viz: (1) Speakers; at student assemblies, P. T. A. meetings, and other adult groups. (2) Films; if available, sound films as "Behind the Shadows" or "Contacts" are self-explanatory and very impressive. (3) Faculty education; this may be accomplished by lectures to the teachers who in turn can conduct regular quiz courses on tuberculosis: 100% faculty cooperation will aid materially in raising the number of consents. An essay contest for the students may help to stimulate interest. (4) Health Posters; these should be displayed in the school and public buildings. A poster contest in conjunction with the case finding project will often aid in bringing up the percent of consents. (5) Newspapers and school bulletins;

*From the Chicago Tuberculosis Institute.

care should be used in employment of these media. Be certain no misstatements get into print; especially that a positive test denotes tuberculous disease. (6) Letters to parents; if possible an explanatory note directly to the home is an aid in gaining confidence. The suggested methods of publicity may of course be supplemented by any original ideas.

At this meeting propitious dates should be selected for the testing. This should be done with the thought in mind of disturbing the school routine as little as possible. In small schools we have found it best to test the entire group at one time. In larger schools it is advisable to utilize the physical education period, testing the students in small groups. The question of one or more tests will undoubtedly come up. In this connection let it be said that a large number of consents should not be sacrificed for a second test.

Two weeks before the testing is to begin, a general assembly of all teachers and students should be held. Talks may be given by the principal, a physician, and a health minded lay person. If one of the sound films mentioned can be had it paints a more vivid picture. Literature such as "The Tuberculin Test" or "Let Your Doctor Decide" may be distributed to advantage. If no letters have been sent to the parents the students are your main method of contact. They should, therefore, be given a thorough but simple insight into tuberculosis. At this time the students are told they will be given a consent slip and a file card. To be given the test, the consent must be signed by their parents and the card filled out for their record. These are best distributed by the teachers after the assembly. In the general publicity, it is well to make a note of this as there is always a small group that fail to take the slips home. Usually, however, the converse is true, an informed student convinces an uninformed mother to sign his slip.

One week before the actual testing is begun, the slips and cards should be collected. The parental consents should be filed for future reference. No one should be tested without this consent unless he is of age. The file cards are arranged alphabetically for recording the testing and results.

The physician and nurse should at this time select the rooms to be used in the testing. A spacious, light room is required for the testing, and a smaller room with an adjoining dark closet for the x-raying if a portable machine is used. If the school has an infirmary the work should be done nearby since occasionally a student will faint.

You are now ready to begin the testing. The following materials are needed:

1. Two or three tables, one for doctor, one for cleaning arms, one for cards and file.
2. Chairs.
3. A small electric grill or sterilizer.

4. A small basin for sterilizing syringes if a grill is used.
5. An alcohol lamp to flame needle.
6. One pint wood alcohol for lamp.
7. Two pints rubbing alcohol for cleaning arms.
8. One pound cotton.
9. Tuberculin syringes and needles.
10. A centimeter rule for measuring size of reactions.
11. Bottles for mixing tuberculin.
12. Two waste paper baskets.
13. Spirits of ammonia (if student faints).
14. Doctor's gowns and towels.
15. Three sheets for table covers.
16. Washbasin and soap for doctor if running water is not available.
17. *For x-raying*—shoulder capes and large paper napkins to cover the cassette holder.
18. *For physical examination*—Thermometers, tongue depressors, shoulder capes, and clinical health forms.

The strength of the material to be used is a matter of individual choice. For two tests we use first and second strength P.P.D. (Purified Protein Derivative). For a single test 1/10 of the 2nd strength P.P.D. If O.T. is to be used in a single test, 1-1000 is employed. If O.T. is used in two tests, 1-10000 and 1-100 is advisable, though 1-1000 and 1-100 may be used.

With everything in readiness the students come to be tested. They receive their cards. The nurse cleans their left forearm if they are right-handed, and vice versa if they are left-handed. They then proceed to the doctor who tests them and accepts the card. Between tests the needle (⅜ in.—26 gage) may be flamed or placed in a sterilizer. We have used the alcohol lamp in some 200,000 tests without infection. If a sterilizer is used many needles are necessary. Either procedure causes a loss of sharpness and necessitates frequent changes. This must be done. Do not use a dull needle. The students are told to return in 48 hours for the interpretation of the tests. At the end of the day's testing, the cards of those tested are again alphabetically arranged. When they return in 48 hours, they are once more given their cards and proceed to the doctor who reads and records the test. If two tests are to be done, the negative reactors are retested at this time and again told to return in 48 hours when the procedure is repeated. It can be readily seen that a two test program consumes an entire week and must begin on a Monday.

Having read the tests, all positive reactors are then x-rayed. The x-raying may be done in a reputable laboratory or hospital of the community, or at the school itself if a portable machine is available. If the latter is used, a current of 30 milliamperes must be produced to obtain sufficient penetration. The question of paper

films may come up. We have not used paper films, but do not believe those we have seen are as clear as the regular films. Whether or not to charge for the x-rays, and the amount of the charge, varies with the individual community.

The x-rays must be interpreted by an experienced and competent observer so that minimal pathology will not be overlooked. Advanced pathology is rarely seen in the high school student.

Having interpreted the x-rays, all with definite and suspicious findings are given physical examinations. Students warranting further observation or treatment are advised to see their family physician. The x-ray will occasionally disclose incidental cardiac or bone pathology. These also are to be examined and referred to their private physician if examination corroborates the x-ray findings.

The work is now completed and the parents must be informed of the results. Negative reactors, positive reactors whose x-ray readings were healthy chest, and positive reactors with x-ray findings of healed childhood tuberculosis are sent form letters. Special letters are sent to those showing pathology or suspicious pathology. All letters should be signed by the school principal and the physician in charge.

Wherever tuberculosis has been found, all members of the family should be tested and x-rayed. A personal call is advisable under such circumstances to acquaint them with the exact nature of the illness. The case once discovered should not be neglected. Most cases will be asymptomatic and tend to disregard the advice offered. For this reason they must be carefully watched. A survey without a follow-up loses much of its value.

What would be ideal would be to investigate the homes of all positive reactors as suggested by Weber, Murphy, and Holcomb.* In so doing these observers found numerous cases of pulmonary tuberculosis. Such a program in conjunction with the school case finding project, will, we hope, become universal.

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School Books and Communicable Disease—The city board of health of the City of New York has revoked the regulations prohibiting the use of schoolbooks in homes where communicable diseases have been reported. The change has been made because the health authorities now say that transmission of communicable diseases is rarely affected by inanimate objects. This has been found true in the so-called childhood diseases, such as chickenpox, mumps, measles, scarlet fever, and diphtheria. — The American School Board Journal, October, 1938, page 51.

*Weber, G. W., Murphy, K. M., Holcomb, F. W. The Intracutaneous Tuberculin Test and the Use of the Fluroscope in a County Survey. American Review of Tuberculosis, 1935: 32: 331.

TUBERCULOSIS CASE FINDING AMONG CHILDREN*

The Importance of Certain Age Groups

WILLIAM J. RYAN, M.D.*

The work of tuberculin-testing and x-raying of school groups has not progressed sufficiently, it would seem, for us to begin to establish a fair evaluation of its significance in this all important problem of the control of tuberculosis. There are some who would consider it as having but a small place in the tuberculosis control program, while others, it would appear, are concentrating the major efforts of this epidemiological problem on the school student and the young child.

We may first assume that there is no other test in medicine which is more specific than the tuberculin test.

Now, what is the significance of the results of tuberculin testing in a given community?

1. It is reasonable to assume that the incidence of positive reactors to tuberculin among the young is the best criterion as to the amount of infection in a given community.

2. If this be true, there is considerable evidence to indicate that there has been a rapid diminution of the incidence of infection during the past ten years. Myers, Douglas, and ourselves, as well as many others, have demonstrated this fact.

In our investigation, the students of two high schools in Rockland County, with a student population of approximately 700, each were tuberculin tested in 1931 and again in 1935. While the age groups, the amount and source of the tuberculin given were constant, from 1931 to 1935 the percentage of positive reactors was reduced by one-half—namely from about fifty per cent to a little over twenty-five per cent. This rapid reduction in the incidence of tuberculosis infection in the young as reported by so many observers is, in our mind, difficult to entirely explain; for example, in our particular communities, no unusual program had been carried out to uncover and isolate disseminators of tubercle bacilli during those four years, in which there was such a tremendous reduction in the incidence of infection.

On the other hand, it would appear, at least in many communities, that the number of recorded tuberculosis cases is constantly on the increase, perhaps not due to an increasing morbidity but rather to a more intensive case-finding program.

Isolation of carriers of bacilli by hospitalization, in addition to the increased use of ambulatory artificial pneumothorax treatment, which changes many patients from open to closed cases, has been no doubt a factor in the prevention of spreading bacilli to their human associates. Again, the improved technic of milk pasteuriza-

*Pomona Medical Director, Summit Park Sanatorium.

*Read at the Annual Meeting of the Medical Society of the State of New York, Rochester, May 25, 1937. Reprinted from the New York State Journal of Medicine, May 1, 1938, p. 494.

tion and more complete eradication of bovine infection by tuberculin-testing may be additional factors in the reduction of the amount of infection.

As to the wholesale tuberculin-testing and x-raying of the public school children, we will first present briefly the results of our study in Rockland County.

The work was instituted in the Spring of 1931, selecting the seventh and eighth grades and all the four-year high school students.

Procedure.—.5 Mg. of old tuberculin was administered by the Mantoux method. To January 1937, 10,033 pupils or eighty-five per cent of the total school population gave consent and received the tuberculin test. Of this number, 4544 or forty-five per cent were positive to tuberculin, all of whom were x-rayed with portable equipment on celluloid films. All students with questionable x-ray shadows in their films were re-x-rayed at the sanatorium with high-powered equipment.

Results.—Of the 10,033 pupils examined, there were found:

Manifest disease	102 or 1.0%
Childhood type healed	479 or 4.8%
Observation	455 or 4.5%

From these figures it would seem that one per cent of over 10,000 children was a large percentage to find with active disease. This number, we now believe, was indeed far too high; subsequent re-examinations placed a great many of those cases in either the observation or apparently healed group. In fact, of the entire number, a recent review covering the period from one to seven years reveals the fact that but ten (one-tenth of 1%) were in need of any kind of treatment. It is interesting to note that no deaths from tuberculosis have occurred in this group of students since the survey was begun.

One hundred and six parents of the children whose x-rays revealed massive infection were also x-rayed—forty-four fathers and sixty-two mothers. But two active cases were discovered, not a very productive finding, although a total of thirty-eight films showed the presence of some abnormal shadows, the majority of whom were classified as minimal arrested or the healed childhood type of tuberculosis and of but little clinical significance. It was, however, quite possible that some were the original disseminators of the tubercle bacilli.

In addition, there were x-rayed 609 members of the faculty, most of whom were classroom teachers; five active and seventeen arrested cases were uncovered.

In comparison, we now wish briefly to present the results of 1,091 definitely known contact cases who were examined during the past five years. There were none included in this group who were referred by physicians, on account of having or being suspected of

having tuberculosis. They were merely those apparently well who were urged to report for examination because of having been at some time exposed to an open case of tuberculosis.

The following were the findings:

Far advanced		7
Moderately advanced		15
Minimal		82
Childhood and arrested adult type		35
Negative		952
Cases with positive findings	(13%)	139

It is, therefore, obvious how important it is to thoroughly examine the contacts before attempting to explore new and less fruitful fields.

Summary

The methods which have been used in the past to detect early tuberculosis have proven far from satisfactory. This is evidenced by the fact that eight per cent of the sanatoria beds in this country are occupied by patients who are either in the moderately or far advanced stage of the disease.

Further education of the public, as well as of the medical profession, in the symptoms and signs of the disease has failed to accomplish the desired results, and the reasons are obvious to those of us who are engaged in the clinical side of tuberculosis; namely that early tuberculous lesions frequently cause none of the more common symptoms such as cough, loss of weight, fever, hemoptysis, and malaise. It is, therefore, apparent that some other course must be pursued.

It is our belief that with the present status of the tuberculosis problem confronting us, a very large percentage of the general population will eventually be x-rayed or fluoroscoped for the detection of tuberculosis. With the increased use of the Roentgen ray by the general practioner in his office, the time is not remote when he will play the important part in the diagnosis of this disease, but he needs special instruction in the radiographic interpretation of the chest.

While we have been skeptical in the value of fluoroscopy as a means of detecting early pulmonary pathology, and are still without experience, it would appear from numerous reports that in skilled hands x-ray screening is proving of great value and is being convicted of but three to four per cent error.

The progress made in the examination of high school and college students together with the further investigation of their homes for the source of infection is indeed commendable, but we are of the opinion that this procedure of itself is entirely inadequate to make an appreciable "dent" in the tuberculosis morbidity and mortality.

We are in favor of continuing this investigation where funds and personnel are available; the educational value to the public alone would warrant it, but some other new methods must be pursued.

It is generally understood that concerted activity should be directed toward the known-contact group, since continued investigation at this source will bear the greatest fruits for the amount of effort and money expended.

It has been laid down as an axiom by Danish tuberculosis specialists that until the possibilities of all contact cases have been exhausted, a community or school survey must be regarded as an expensive luxury.

Our next step should be to concentrate our efforts on those engaged in industry, particularly special groups of young women, as well as those of the male population who mainly come in the age-group of relatively high morbidity and mortality. The time is ripe when we should investigate this field more intensely.

It would, therefore, appear that wholesale diagnosis of early pulmonary tuberculosis hinges, at the present, on radiological examination of the lungs of as many persons as possible, the apparently well included.

While it may be impractical, I am inclined to agree with the British tuberculosis medical officer whose assistant erred and radiographed an apparently well person. The young assistant expected to be severely censored by his superior, but instead the reply of the physician was "young man, you have no cause for regret; we have just proved that another Englishman is free from tuberculosis."

* * * * *

Appreciation for Dr. Sundwall—At the annual meeting of the American School Health Association at Kansas City, the Governing Council of the Association, by unanimous vote, expressed their appreciation for the extremely helpful and efficient service which Dr. John Sundwall had rendered during the two years that he was President of the Association. He carried the Association through a very critical two-year period of reorganization, and brought about a real functioning of the Governing Council.

As a token of its appreciation, the Council ordered that a special certificate be prepared and presented to Dr. Sundwall, expressing the vote of the Governing Council and the gratitude of the Association.

* * * * *

THE CONTROL OF TUBERCULOSIS IN EDUCATIONAL INSTITUTIONS

H. D. LEES, M.D.*

The very wise emphasis which is now being placed upon health education as an integral part of the school curriculum marks an advance of real practical value. The school health program as conducted in many communities during recent years, has been a most potent factor in the advancement of the public health. Its results are expressed in terms of a lessened incidence of disability and disease and the actual saving of human lives. Physicians and educators have recognized the need for more effective health supervision for all age groups, and new phases of school health activities have been developed along a broad front. With twenty-nine million boys and girls, young men and young women, enrolled in our public and private schools and in colleges and universities throughout the country, we are provided with ideal organization and facilities for the teaching of sound health practices. Almost twenty-five per cent of our population can thus be enrolled each year as participants in organized health activities. In spite of the advance of medical science during recent years, much remains to be done if we are to reduce further the needless sacrifice of human lives which we see year after year. Ignorance and neglect are largely responsible for the great annual toll of preventable deaths. Health education is the medium through which future accomplishments will be largely achieved. It is the foundation upon which the entire structure of preventive medicine must be built.

During recent years we have observed a striking growth in activities directed toward the prevention and control of tuberculosis. Our schools, including colleges and universities, have in many instances, assumed the leadership in putting into effect in various communities, programs which are recognized as practically ideal for combatting this widespread disease. Many of these institutions have contributed a great deal toward the standardization of the technique of the modern tuberculosis survey. The many reports to be found in the literature covering the results of such studies conducted in school, industrial, and other groups, have done much to define clearly the tuberculosis problem for us as it actually exists.

In developing a program of tuberculosis control as a part of the school health program, it is of utmost importance that we give careful consideration to the special age group with which we are dealing. We must carefully plan the entire procedure if the best results are to be attained. In the age period five to fourteen years, the incidence of tuberculosis is extremely low; in fact, tuberculosis mortality in children of this age is lower than we find at any other age level. Up to the age of puberty, then, or in the elementary

*Director, Student Health Service, University of Pennsylvania.

school group, the disease is not a serious problem insofar as actual mortality is concerned. During the next five year period, however, there occurs a very sharp rise in the prevalence of the disease as well as in the death rate.

Tuberculosis has frequently been designated as "the foe of youth" and the fifteen to nineteen year age period ushers in the real danger zone for the development of the disease, especially in young women. This point is brought home very clearly by recent mortality figures dealing with tuberculosis deaths by sex and age. It is found that in males aged fifteen to nineteen years, the mortality rate is approximately four times as high as in the ten to fourteen year age group. The female death rate in the fifteen to nineteen year period shows a still greater increase. In fact, tuberculosis mortality in young women aged fifteen to nineteen years exceeds by eighty-six per cent the rate for young men of the same age. On the basis of such information, it is possible to plan more intelligently a program for the detection and control of tuberculosis in the elementary and secondary schools.

Dr. Edwards has reported the results of a tuberculosis survey conducted in the elementary and secondary schools of New Haven, Conn., where a total of 6,393 x-rays were taken. He very wisely included 173 teachers in this survey. In the age group six to ten years, no case of pulmonary tuberculosis was found in 669 children x-rayed. One case of tuberculosis was discovered among 3,879 x-rays in the eleven to fifteen year age group. But six cases were brought to light among 1,461 x-rays in the age group sixteen to twenty years. The results of this study emphasize clearly how increasingly significant the tuberculosis problem becomes with increasing age. The findings of Chadwick, in Massachusetts, where approximately 400,000 school children have been studied by means of the tuberculin test and chest x-ray, indicate that among grade school children approximately one in thirty-two hundred has tuberculosis. In high school groups, representing a more dangerous age period, about one in four hundred and sixty will be found to have the disease.

The procedure usually employed in conducting a tuberculosis survey in the schools consists of applying the intradermal tuberculin test, known as the Mantoux test, to all pupils, and providing x-rays of the chest for those giving positive reactions. The tuberculin test, a simple and harmless procedure, will identify that portion of the school population that has at some time been in contact with and become infected by the germs of tuberculosis. The positive test cannot be interpreted in terms of increased susceptibility nor increased immunity, nor does it differentiate between latent infection and active disease.

As is well known, tuberculous infection is not nearly as widespread as it was some years ago. In many communities throughout

the country, especially in smaller towns and rural districts, less than one-third of high school students will react to tuberculin. Under such conditions, the problem of tuberculosis control is not difficult, since our attention and efforts will be directed towards a comparatively small percentage of the school population. The x-ray costs are reduced considerably by using the tuberculin test as the preliminary step in such a survey, since only the positive reactors need be x-rayed. It should be emphasized that investigation in the home for possible sources of infection should be systematically carried out whenever a pupil is found to present evidence of tuberculous disease.

In Cleveland, Ohio, a recent study revealed 1,649 positive tuberculin reactors among 10,943 children enrolled for the first time in kindergarten or the first grade. Since infection at this early age points more directly toward the possibility of the child having acquired the infection from adult sources in the home, it is the practice in this city to visit the home routinely in search of infectious persons among parents, relatives, maids, etc. As a result of investigation in the homes of the 1,649 positive reactors reported in this study, forty-two cases of open pulmonary tuberculosis that were unknown to the health department were discovered.

In numerous secondary schools a very wise precautionary step has been taken which requires all boys and girls participating on athletic teams to have annual chest x-rays. It is well known that the early lesion of pulmonary tuberculosis is frequently not accompanied by symptoms and that careful physical examination will, in a majority of cases, fail to reveal any abnormal findings. Since the x-ray is the only means of detecting many of these early cases of the disease and since physical activity is most dangerous in that it favors rapid spread of the disease process, the wisdom and value of this procedure cannot be emphasized too strongly. Certain it is, that among the hundreds of thousands of high school boys and girls actively participating in various required activities, as well as in competitive sports, approximately one in five hundred is actually afflicted with tuberculosis. Many lives could be spared if these cases might all be given the advantage of early diagnosis. The parents, the physician, and the school must share the responsibility of protecting the lives of these young people by cooperating in an effective plan of supervision.

Programs for the control of tuberculosis have been developed to a high degree of efficiency in many of our leading universities, colleges, and teacher-training institutions during the past seven years. The American Student Health Association, through its Tuberculosis Committee, has been most energetic in its sponsorship of this special activity as a part of the health program for American colleges. The report of this Committee for the school year 1936-1937 includes tuberculosis case-finding data assembled from ninety-

eight institutions. This group of colleges report a total of 794 cases of tuberculosis discovered during the year, thirty-four per cent of the cases being diagnosed as clinically active. The report brings out very clearly the advantages of providing the tuberculin test and chest x-ray as a routine procedure for a young adult group. It was found that approximately seven times as many active cases per thousand enrollment were discovered by those institutions providing routine x-ray facilities as compared with those where such investigation was carried out only on the basis of questionable physical examination findings or suggestive symptoms. It is the usual observation among workers in this field that the disease has frequently progressed beyond the incipient stage, and has become decidedly dangerous in character, by the time the characteristic symptoms have made their appearance.

Since such widespread interest in tuberculosis control has centered so largely in the school system as well as in institutions of higher learning, it would seem that teacher training institutions have a special responsibility if they are to contribute their rightful share to this excellent program. Certainly the part which the individual teacher plays in the school health program is of utmost importance. Adequate and specialized training must prepare the teacher for active and intelligent leadership in the planning of various health activities. The modern educational procedure must concern itself with functions other than the mere training of the intellect, and new responsibilities must be faced in the selection and training of teacher material.

On the basis of reported studies dealing with the incidence of tuberculosis among teachers in various sections of the United States, it has been estimated that 18,739 tuberculous teachers are today in active service in elementary and secondary schools of this country. Certain of these reports offer convincing proof of the dangers which exist when a teacher suffering from tuberculosis in a communicable form is brought into daily contact with a group of children. The Tuberculosis Committee of the American School Health Association has emphasized the importance of including all adult personnel in the program of tuberculosis control in schools. Unquestionably, if we control tuberculosis among our teachers in training, we shall have gone far towards the solution of the problem in teachers in service. At the University of Pennsylvania, the School of Education requires a chest x-ray of all students at the time of entrance and again in the senior year. In this way we are offering definite assurance to the school directors who may employ our graduates that these young people are free of tuberculosis at the time of graduation. Teachers' colleges should be aware of the fact that in many districts today, both urban and rural school boards are requiring that all applicants for teaching positions must present evidence that they are free of tuberculosis. Applicants must be certified by a

reputable physician, not on the basis of a physical examination as has been the custom in the past, but on the basis of a negative tuberculin test, or negative chest films if the test is positive.

In summary, let me emphasize again that health education is the most essential and most potent factor in the entire field of public health. The success of the splendid program of tuberculosis prevention and control which is making such encouraging progress, depends largely upon activities carried on in the schools, from the first grade straight through to the senior year in college. The problem of tuberculosis is quite clearly defined insofar as sex and age groups are concerned. The disease becomes a much more serious health hazard after the age of puberty has been reached. Case-finding programs in the school should begin with the junior and senior classes in high school, and should be extended to the younger age group only as funds and facilities permit. Teachers and all adult school employees should invariably be included in such a survey. Teachers' colleges should certify all graduates as being free from tuberculosis in communicable form on the basis of required chest x-rays for all entering students and this examination should be repeated during the senior year. Tuberculosis is a preventable disease.

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REVIEW

Physical and Health Education,—Smith, Helen Norman, B.S., and Coops, Helen Leslie, Ph.D., American Book Co., New York, 1938, pp. 323, price $2.25.

This is an excellent text containing much practical usable information. It is valuable not only for the specialist in training and in service, but for the classroom teacher both in training and in service, and for principals, superintendents, and other administrative officers.

While it expounds the basic theories underlying physical education and the health sciences, it does not waste the reader's time and patience with too much philosophizing as several more prolific writers are prone to do.

It presents chapters on Definitions and Relationships, Basic Meanings, Curriculum Development, Physical Education, Related Activities (such as corrective and remedial work, camping activities, recreation programs and hobby clubs), Health Service, Health Instruction, Healthful School Living, and a very valuable chapter on Sources of Material.

This is a badly needed practical text. While modern in outlook, it makes it clear that the teacher must actually *teach* rather than merely sit on the bench while the children or students participate in undirected and often misdirected play. Even play and sports are better for being properly taught, supervised, and administered.

CHARLES H. KEENE, M.D.

EDITORIALS

Exactly nineteen years ago, on November 1, 1919, the Editor of this Journal assumed the duties and responsibilities of Executive Secretary of the Delaware State Tuberculosis Commission. This Commission had recently been organized, subsequent to a special act of the Legislature of that state, in an effort to bring to bear on the urgent problems of tuberculosis more funds and more administrative pressure than seemed possible through the State Board of Health. Long since, however, its duties and activities have been very properly merged with those of the State Health Department. This item of personal history is given not because of any inherent interest to our readers, but as an example of special effort on the part of those interested citizens in that state who were trying to overcome the ravages of that scourge. When you are told that one of the leaders of the earnest group responsible for this law and organization was Miss Emily Bissell who, representing the Delaware Tuberculosis Association, through energetic and helpful support and cooperation was so largely responsible for the results that followed, the item immediately assumes national interest.

The national death rate from tuberculosis, all types, that year was 124.9, and for the state—the first year that the death returns from Delaware were accepted for national registration—was 163.6. For the year 1936, the rates respectively were 55.7 for the nation, and 49.4 for the state. This phenomenal gain, occurring in considerably less than one generation, is one of the outstanding achievements of preventive medicine.

These remarkable improvements, shown in the diminished rates also of numerous other states, have tended to lull many into a state of contentment with the present tuberculosis situation which the actual facts do not warrant, and has resulted in a potentially dangerous attitude on the part of many officials and communities. The real facts are so splendidly presented by the following editorial from the New England Journal of Medicine for October 6, 1938, that by permission of that Journal it is reprinted.—C. H. K.

* * * * *

Still the Great White Plague.—The undesirability of having pulmonary tuberculosis seems hardly to need proof; certainly, a generation or two ago one would scarcely have considered this a point worth raising. However, as any disease gradually comes under control, as its morbidity decreases and its fatality rate recedes, there is danger that we may view it too complacently, thinking of it in relative terms compared with its previous importance.

We are accustomed to consider measles to be a relatively innocuous disease, and experience a rude awakening when a patient dies of it. The general mildness of scarlet fever in recent years has lulled us into a sense of security regarding its invasions, which may, during any season's epidemic, prove false.

In a general sense we know, without analyzing any figures, that fewer persons than formerly have tuberculosis; that of those who have it, fewer are likely to meet with an untimely death on its account. There is a psychologic hazard involved, and we cannot afford to adopt an attitude that might lead us to look with contempt on what is still the "great white plague".

A study of mortality among individuals with active pulmonary tuberculosis has recently been made for the Milbank Memorial Fund by Jean Downes and published in the Quarterly Journal* of that organization. The data presented in this study include essentially all the active cases of the adult pulmonary form of tuberculosis reported or discovered in the County of Cattaraugus, New York, during the twelve-year period, 1923-1935.

As a result of this study, it is apparent that more than five times the number of deaths that might be expected of normal individuals occur among individuals with active minimal tuberculosis; that ten times the expected number occur among those with moderately advanced tuberculosis; and that approximately fifty times the expected number occur among those in an advanced stage of the disease. Moreover, 4 or 5 per cent of the reasonably satisfactorily arrested cases suffer a breakdown each year.

A report in the same number of the Quarterly by Bailey B. Burritt on social and economic problems in the control of tuberculosis indicates that lack of adequate attention to the personality of the patient and to the social and economic needs of his family often nullifies and puts to waste the efforts of clinics and sanatoriums in his behalf. It is suggested that special consideration for tuberculosis cases could and should be secured from relief authorities and that further amendment of the Social Security Act, adding tuberculous families to those eligible for relief with federal aid, should be made. Editorial, New England Journal of Medicine, Oct. 6, 1938, p. 541.

* * * * *

REPORT OF COMMITTEE ON TUBERCULOSIS†

During the past year, the Tuberculosis Committee has contacted the secretaries of the state tuberculosis associations and reports are now being received as to the number of tuberculin tests administered to school children, personnel, etc., together with the subsequent findings of the reactors. It is encouraging to see the great interest being manifested in this work in some of our states. The actual figures should be available before this report is published.

There is considerable tendency throughout the country for state boards of health to take over the tuberculosis case-finding

*Milbank Memorial Fund Quarterly. July, 1938.

†Presented by the Committee on Tuberculosis of the American School Health Association at the annual session at Kansas City, Mo., Tuesday, October 25th.

work, including the schools. This is as it should be, and it appears that the educational work of our tuberculosis associations and the schools has been influential in convincing the official health agencies that tuberculosis should be a part of their program.

In most of the states, a physician has been selected to work with our Tuberculosis Committee in the assembling of data each year. This should also stimulate more work on the part of school physicians in each state. In several states, areas have been selected where the tuberculin test will be administered to as many first grade children as possible each year over five years. This should provide definite information as to how rapidly the incidence of infection is decreasing among children of this age period. It should also lead to the finding of sources of their infection.

Our final report will show that there is a rather wide range in the percentage of children whose parents give consents for tuberculin testing. In some places this percentage is as high as 98. Apparently this is largely a matter of the educational work that has been done in the community, since in some places when the program began, less than 50 per cent gave consent, whereas at present, this has been increased to 98 per cent.

Inasmuch as we have no other phase of the examination which can in any way be considered as a substitute for the tuberculin test by way of providing us with certain important information, it is necessary that educational work be increased and intensified everywhere in order to reduce to a minimum the number of persons who refuse the tuberculin test. The Committee is trying to stimulate such educational work. In some states only Purified Protein Derivative is being used, in others only Old Tuberculin, while in the remainder both preparations are in use.

A number of inquiries are being received as to the efficacy of the patch test, as it is believed by some that more consents will be obtained if there is no instrumentation in the administration of the test. Although there is no accurate measure of dosage possible when the patch test is employed, apparently the percentage of reactors is essentially the same as when the intracutaneous method is used. Inasmuch as there does not appear to be any close relationship between the degree of sensitivity to tuberculo-protein and the presence or absence of clinical disease in the human body, it probably is of little value to emphasize the degree of reaction. As yet, the only information we obtain from the tuberculin test with reference to tuberculosis in the individual case is the presence or absence of the primary complex, and a typical tuberculin reaction does this regardless of its degree.

Where large numbers of children or adults are to be tested in a short time, the patch test would appear to be more time-consuming than the intracutaneous test. Moreover, some criticism has been voiced concerning the patch test with reference to inter-

ference through perspiration, etc. Since the intracutaneous test has been so well standardized, its great value is becoming so generally accepted, and Purified Protein Derivative is available, it seems wise to continue with this test unless some other method of administration becomes available that actually has distinct advantages over it. The education of the public to the point where nearly all not only submit to, but request this test has been clearly demonstrated in several parts of the country. The cost of administering the tuberculin test apparently varies a good deal. For example, in one state, a county organization reported a cost of $10.00 per thousand, whereas, another county organization reported $150.00 per thousand.

The making of x-ray films of the chests of children is being discouraged throughout the country, since it has been shown that the chest of the child who reacts to tuberculin rarely shows any significant shadows on the x-ray film. In other words, such a large number of children of grade school age must be examined to find a single case of clinical tuberculosis that it is not good economy to make x-ray films in this age group. However, the tuberculin test is of great value among the grade school children in locating the communicable cases among their close adult associates. For example, in 1937, Edwards of Cleveland administered the tuberculin test routinely to those entering the first grade, junior high, and senior high schools. Where tuberculin reactions were recorded, an attempt was made to find the sources among the adult associates. This resulted in the detection of 163 previously unreported cases of pulmonary tuberculosis. There is still the feeling, however, that when the high school age period is reached, the x-ray film should be employed for all of the tuberculin reactors. While it is true that it may be necessary to examine four hundred to even a thousand to find a single case of clinical tuberculosis, the expense involved is justified because of the communicability of the disease.

If modern inexpensive methods are employed, it is less costly to find a case when it can be treated successfully and in a short time, than it is to treat such a case over the long time necessary after the disease has become advanced. The cost of the x-ray film still remains a serious handicap in some parts of the country. One tuberculosis association secretary writes that in her city, a single examination by x-ray cannot be obtained for less than $15.00. In another state, the cost of making each x-ray film varies from seventy-five cents to $5.00. The secretary of that state pointed out that the usual price made to tuberculosis organizations in the examination of healthy appearing tuberculin reactors is $1.00 for paper film and $2.50 for celluloid film. Provision can now be made to make x-ray examinations of the chests of large groups of apparently healthy tuberculin reactors for $1.00 apiece or less.

Unfortunately, there has been an over-estimation of the ability

of any physician to make final diagnoses from the x-ray examination alone. This has reached such a degree that in some states, no consideration is given to anything except the tuberculin test and the x-ray film. Therefore, our Committee is of the opinion that we should strongly emphasize the inadequacy of such examinations, since tuberculin and x-ray examinations simply serve as screens to select those individuals who should have complete examinations. A report comes from one high school group where among the tuberculin reactors, five were reported, from the x-ray alone, as having pulmonary tuberculosis. Within two or three weeks, the shadows had completely disappeared in three of them, indicating that they were not due to tuberculosis. Considerable harm was done to the cause, and will be done, wherever such practice is encouraged. The shadows on the x-ray film should only indicate to us that further study is necessary before arriving at final diagnoses.

This Committee has constantly recommended adequate periodic examinations for teachers and other members of school system personnel. It is most encouraging to find that such examinations are now being required in many parts of the country.

Signed:

WM. P. BROWN
HUGH A. BROWNE
H. A. BURNS
H. D. LEES
ESMOND R. LONG
J. B. NOVAK
WM. J. RYAN
JESSAMINE WHITNEY
J. A. MYERS, *Chairman*

* * * * *

ABSTRACTS

"Tuberculosis Among Children and Young People in Cattaraugus County, New York"*—Cattaraugus County, New York, has a population of 72,000, mostly rural, ninety per cent of which consists of native-born Whites. The only racial element with a high tuberculosis death rate is Indian, the rate among the 1100 Indians having been for some years six times that among the Whites. Few of the population are subjected to special tuberculosis occupational hazards.

The tuberculosis death rate which was stationary for some years prior to the organization of a County Health Department in 1923 has declined from 72.6 per 100,000 in 1923 to 28.8. During this period modern case-finding procedures have been used and a County Sanatorium with adequate bed space has been available. Tuberculosis in cattle has been practically eliminated.

During the past 15 years there were seventeen tuberculosis deaths in children under 15 years of age and none has occurred since 1932. Tuberculin tests indicate a definite decline in the tuber-

*Abstracted by the author, John H. Korns, M.D., Director, Bureau of Tuberculosis, Cattaraugus County Department of Health, from a paper which he presented before the Child Hygiene Section of the American Public Health Association at the Sixty-sixth Annual Meeting at New York, N. Y., October 5, 1937. Published in full, American Journal of Public Health, February 1938, page 167.

culosis infection incidence during the above period. Excepting the Indians, it is very unusual to find a child below high school age who responds positively to a tuberculin test unless definite exposure has occurred within the home. The incidence under school age seems to be less than 5%.

Because very few deaths from tuberculosis occur under age 15, and because the primary infection is rare and mild, little medical care of infected children is provided. The policy followed is to leave such children in the home but to remove and treat the open case. Also it is felt, on the basis of experience, that institutional care of primary tuberculosis does not prevent the development later of the reinfection type.

Tuberculosis in adolescents and in early adult life is more serious and it is more difficult to locate the source of infection than in young children.

Tuberculosis deaths under age 25 during the past 15 years numbered 105, an average of seven per year. Subdivided roughly into five-year periods the annual deaths averaged for the successive periods approximately 11, 7 and 3, so that there has been, in this age period, an encouraging decline in deaths.

Since 1928, 106 persons between ages 15 and 24 have been found to have reinfection tuberculosis, and in less than a third of these was it at all definitely established that the primary infection had occurred within the home. In some, the source was suspected to be among schoolmates or others outside the home. Hence the need for searching more widely than among known contacts, if one is to find all the cases.

By repeatedly x-raying known juvenile contacts through adolescence to age 25, early diagnosis has been found possible, and this group has been found to yield a high proportion of reinfection cases. Among 377 juvenile reactors followed by x-ray examination for a period of from 3 to 12 years, 11.7% of 119 who were known to have been exposed to a positive sputum have shown reinfection tuberculosis, while only 1.5% of 198 who were not known to have had such exposure have done so. By supplementing this prolonged follow-up of tuberculin reactors, especially of known contacts of open cases, with x-ray surveys of juniors and seniors in high school the Bureau of Tuberculosis is able to report that since January, 1936, 86% of all cases of pulmonary tuberculosis thus found under age 25 were in the minimal stage.

A tuberculin and x-ray survey of 650 Indians did not reveal new active tuberculosis at the time but resulted in adding to the roster many tuberculin reactors in the 15-24 year age group. Subsequent follow-up of these has revealed two cases of pulmonary tuberculosis.

There would seem to be justification for repeated x-ray surveys of apparently healthy young people, whether in high school or college or in industry, since more than two-thirds of the reinfection cases in this age period could not trace their source of infection, and for the additional reason that occasionally through such surveys young persons may be diagnosed who are still being exposed to mild, unreported but open cases of pulmonary tuberculosis in the home or elsewhere. These measures have educational as well as diagnostic value.

Where funds are limited, provision should be made for adequate diagnostic facilities for all patients referred by private physicians and for all contacts. This should be done thoroughly first. Then, if there are additional funds and facilities, other groups of young people may be similarly examined.

REVIEW

Fit to Teach: A Study of the Health Problems of Teachers,—Ninth Yearbook, Department of Classroom Teachers, National Education Association, Washington, 1938, pp. 276. Price $1.00.

This is a splendid study and report by the Yearbook Committee of the Department under the chairmanship of Mary D. Barnes. It covers well a field that has been much neglected in the literature.

The opening sentences of the Foreword, written by Emily Tarbell, President of the Department, state what is fundamentally true, but little realized by superintendents, boards of education, parents, or taxpayers. "Health is essential to efficiency of the highest attainable level in almost any line of work. It is peculiarly important for teachers, not only because of the strenuous demands of the classroom on their strength and energies but also because teacher health is the corner-stone of any effective school health program."

Upon such a concept are built chapters on the problems involved, and on the meaning of health, efforts to answer the question "Are teachers healthy", their personal health practices, their mental health, their spiritual health, the school environment, outside environment, the community responsibility, health promotion, preservice training, and a most important chapter which discusses health as a prerequisite for certification, for employment, and health protection during the probationary period.

Of the women, 41.8% and of the men, 50.5% report having no hobby. If their concept of a hobby is similar to the reviewer's, this is a serious lack in *living*. In 13.8% of the teacher training institutions, no health examination is given. In these particular institutions, either self determination is running wild or the administrative concept of their health responsibilities is far from modern.

CHARLES H. KEENE, M.D.